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1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 7, 2011 has been entered.

2. The drawings are objected to because of the reasons, *inter alia*, listed below:

(a) The drawings are not in compliance with 37 CFR 1.84. See Form PTO-948 attached;

(b) 37 CFR 1.84(p)(5) states: "Reference characters not mentioned in the description *shall not* appear in the drawings. Reference characters mentioned in the description *must* appear in the drawings." Here, *e.g.*, FIGS. 1 and 2 show the reference characters α , β , and γ , *etc.* but the specification does not mention these reference characters, on the other hand, Spec. p. 6 describes the axes A_1 and A_2 in FIG. 1, however, FIG. 1 does not show the reference characters A_1 and A_2 ;

(c) The drawings are inconsistent with the specification and/or the claims. See 37 CFR 1.121(e). For example, the specification describes and claim 15 claims that the hose 4, 4c is made of a flexible material such as composite material (Spec. pp. 9 and 10), however, the hatching of the cross-sectional view of the hose 4c in FIG. 4 shows that the hose 4, 4c is made of metal in accordance with the drawing symbols for draftsperson in MPEP § 608.02; and/or

(d) Each part of the claimed invention, such as, the hollow opening and the boundary wall of the inner protection hose in claim 1; the metal reinforcing member in claims 15-20; and the plurality of hoses and/or cables in claims 21-23 should be designated by a reference character. See MPEP §§ 608.01(o) and (g).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the metal reinforcing members comprising the rings and/or spiral/helical wires in claims 15-20; and the plurality of hoses and/or cables arranged inside the inner protection hose in claims 21-23 must be shown or the features canceled from the claims. *No new matter should be entered.*

4. The listing of references in the specification (DE 3431033) is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper."

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Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

5. The use of the trademark such as TEFLON has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology. Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

6. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

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7. The disclosure is objected to because of the informalities, *inter alia*, listed below:

(a) The specification should be arranged in the order listed above, *e.g.*, the description of prior art, *i.e.*, FIGS. 1, 2, and 6b should have been arranged in the Background of the Invention instead of the Description of the Preferred Embodiment;

(b) Each part of the claimed invention, such as, the hollow opening and the boundary wall of the inner protection hose in claim 1; the metal reinforcing member(s) in claims 15-20; and the plurality of hoses and/or cables in claims 21-23 should be designated by a reference character. See MPEP §§ 608.01(o) and (g);

(c) The written disclosure is inconsistent with the drawings. See 37 CFR 1.121(e). For example, the specification describes and claim 15 claims that the hose 4, 4c is made of a flexible material such as composite material (Spec. pp. 9 and 10), however, the hatching of the cross-sectional view of the hose 4c in FIG. 4 shows that the hose 4, 4c is made of metal in accordance with the drawing symbols for draftsperson in MPEP § 608.02; and/or

(d) The specification is not in compliance with 37 CFR 1.84(p) (5). For example, FIGS. 1 and 2 show the reference characters α , β , and γ , *etc.* but the specification does not mention these reference characters, on the other hand, Spec. p. 6 describes the axes A_1 and A_2 in FIG. 1, however, FIG. 1 does not show these axes.

Appropriate correction is required.

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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9. Claims 15-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 15-20 claim at least one metal reinforcing member comprising the rings, spiral or helical wire. However, the specification (pp. 9 and 10) inadequately describes and the drawings do not show, *inter alia*, the reinforcing member(s) and how the reinforcing member(s) is(are) structurally connected with other elements as claimed.

Claims 21-23 claim the plurality of hoses and/or cables arranged inside the inner protection hose 4c comprising any from the list of hose, wire, feed rod, cable, *etc.* However, the specification (pp. 6 and 7) inadequately describes and the drawings do not show the hoses and/or cables and how the hoses and/or cables are structurally connected with other elements.

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. Claims 1-4, 9-24, and 26-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term such as “rotatable” in claim 1 is vague and indefinite in the sense that things which may be done are not required to be done. For example, the parts arranged in series are rotatable, but are not required structurally to be rotated. See “crimpable” in *In re Collier*, 158 USPQ 266 (CCPA 1968); “discardable” in *Mathis v. Hydro Air Industries*, 1 USPQ2d 1513, 1527 (D.C. Calif. 1986); “removable” in *In re Burke Inc.*, 22 USPQ2d 1368, 1372 (D.C. Calif.

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1992); and “comparable” in *Ex parte Anderson*, 21 USPQ2d 1241, 1249 (BPAI 1992) cited in MPEP § 2173.05(b).

It is unclear:

(a) Whether a confusing variety of terms, such as, (i) “a plurality of rotatable parts,” “a first wrist part,” “a second wrist part,” and “a third wrist part” in claim 1; (ii) “a boundary wall” in claim 1, “a substantially cylindrical wall” in claim 11/1, and “a cylindrical wall” in claim 12/11/1; (iii) “a positive bevel angle” in claim 2 and “a positive gear angle” in claim 28; and (iv) “at least one annular gear member” and “a gear member” in claim 26/1 refer to the same or different things. See MPEP § 608.01(o) and double inclusion in MPEP § 2173.05(o). Applicant is respectfully suggested to identify each claimed element with reference to the drawings;

(b) Whether the terms that appear at least twice such as “a negative bevel angle” in claim 2/1; and “a third wrist part” in claim 24/1 refer to the same or different things. See double inclusion in MPEP § 2173.05(o). Applicant is respectfully suggested to identify each claimed element with reference to the drawings;

(c) Whether claim 22 calls for a Markush group or not. If it claims the Markush group, the open term “comprise” is improper because the Markush group is by its nature closed. See MPEP § 2111.03; and/or

(d) Which or what structures define the claimed elements such as the metal reinforcing member(s) in claims 15-20 and the plurality of hoses and/or cables in claims 21-23. Applicant is respectfully suggested to identify each claimed element with reference to the drawings. See MPEP §§ 608.01(o) and (g).

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The term “negative” in claim 1 (or “positive” in claim 2) is a relative term which renders the claim indefinite. The term “negative” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Whether an angle is “negative” or not would depend upon subjective determination of an individual with respect to a subjective referential datum. See also the Office action of EPO cited in the IDS filed on May 18, 2010 and *Supplementary Examination Guidelines for Determining Compliance With 35 U.S.C. 112 and for Treatment of Related Issues in Patent Applications*, 76 FR 7162 (Feb. 9, 2011).

12. Claims 1-4, 9-14, 24, and 26-28, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art (hereinafter “APA”) in view of Akeel (US 4,708,580 cited in the Office action of EPO).

Claim 1

APA shown in Applicant’s FIGS. 1, 2, and 6b and described in Applicant’s specification teaches a robot wrist with a plurality of rotatable parts 1-3 arranged in series with each other, comprising at least a first wrist part 1 arranged in use to be mounted to a robot arm or automation machine to enable rotary movement of the first wrist part 1 about a first axis D-D, a second wrist part 2 journaled in the first wrist part 1, a third wrist part 3 journaled in the second wrist part 2, and at least one annular gear member to drive a said rotary movement of any said wrist part relative to said another wrist part, the at least one annular gear member comprising a hollow opening, and an inner protection hose 4 extending through the hollow opening in the at least one annular gear member, wherein an axis of rotation A_1 between the first and second wrist parts 1

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and 2 intersects an axis of rotation A_2 between the second and third wrist parts 2 and 3 (Spec. pp. 1, 6 and 8).

In summary, APA teaches the invention substantially as claimed. However, APA does not explicitly teach a negative bevel angle being a concave bevel gear (claim 2, Spec. pp. 10-12).

Akeel teaches the negative bevel angle being a concave bevel gear 70 in order to provide greater flexibility for the robot wrist (*id.* 1:59-2:46, 4:51-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to change the gear angle of at least one gear member of APA to negative angle in order to provide greater flexibility for APA's robot wrist as taught or suggested by Akeel. The change of the gear angle of at least one gear member of APA to be negative angle would not have been uniquely challenging to a person of ordinary skill in the art because it is no more than "the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement." *KSR Int'l. Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007) and it "does no more than yield predictable results." *KSR* at 1739.

Claim 2

APA teaches at least one of said gear members arranged with a convex bevel gear with a positive bevel angle relative to a plane perpendicular to the rotation axis (FIG. 6b). Akeel teaches at least one other said gear member arranged as the concave bevel gear such as 70 with the negative bevel angle.

Claims 3 and 4

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To choose Akeel's negative bevel angle in the range between 0 and -20° or -8° and -12° would have been a matter of choice in design since the claimed structures and the function they perform are the same as the prior art. *In re Chu*, 66 F.3d 292, 36 USPQ2d 1089 (Fed. Cir. 1995) citing *In re Gal*, 980 F.2d 717, 719, 25 USPQ2d 1076, 1078 (Fed. Cir. 1992). See also *stare decisis* regarding obviousness of ranges in MPEP § 2144.05.

Claim 9

APA's inner protection hose 4 is arranged so as to pass through the inside of the wrist parts 1-3 arranged in a single circular arc when the wrist is in a bent position (FIGS. 1 and 6b).

Claim 10

APA's inner protection hose 4 passing through the inside of the wrist parts 1-3 inherently has or is capable of having the same total length when arranged in each of a bent and a straight position (FIGS. 1 and 2). See Applicant's analogy in third paragraph on p. 9 of the amendment.

Claim 11

APA's inner protection hose 4 is a hose with a substantially cylindrical wall (FIG. 6b).

Claim 12

APA's inner protection hose 4 is a hose with a cylindrical wall that has a straight and parallel wall cross-section (FIG. 1).

Claim 13

APA's inner protection hose 4 is a hose with a wall cross-section in the form of a wave (FIG. 6b).

Claim 14

APA's inner protection hose 4 comprises an articulated hose comprising circular sections of at least two different diameters (at the peaks and the bottoms of the waves in FIG. 6b).

Claim 24

To arrange Akeel's negative bevel angle of gear member of the second wrist part facing APA's third wrist part would have been a matter of choice in design since the claimed structures and the function they perform are the same as the prior art. *In re Chu supra*. See also *stare decisis* regarding rearrangement of parts in MPEP § 2144.04.

Claim 26

A gear member of APA's first part 1 is arranged to engage a gear member of APA's second part such that APA's second wrist part 2 transfers effect to rotatably drive a gear member of APA's third wrist part 3 engaged by a second gear member of APA's second wrist part 2 (FIGS. 1, 2 and 6b).

Claim 27

APA's second part gear members transferring effect to APA's third part gear member are arranged in APA's second part 2 such that their axes of rotation are at an inclined angle to each other (FIG. 2).

Claim 28

To rearrange APA's first and third part gear members such that they are convex bevel gears with a positive gear angle and APA's second part gear member such that it is a concave bevel gear with a negative bevel angle taught or suggested by Akeel would have been a matter of choice in design since the claimed structures and the function they perform are the same as the prior art. *In re Chu* and *KSR, supra*.

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13. Claims 15-23, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Akeel as applied to claim 13 above, and further in view of Fisher et al. (US 6,390,141).

Claims 15 and 16

APA and Akeel teach the invention substantially as claimed. However, APA and Akeel do not teach the polymeric material such as fluoropolymer for the hose combined with at least one metal reinforcing member.

Fisher teaches the polymeric material such as fluoropolymer for the hose 10 combined with at least one metal reinforcing member in order to provide resistance to internal pressure (*id.* see, *e.g.*, 2:65-4:14, 5:58-6:54, 7:4-39, and claims 1-24).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to select fluoropolymer for making APA's hose combined with at least one metal reinforcing member in APA's robot wrist modified by Akeel in order to provide resistance to internal pressure as taught or suggested by Fisher. *KSR supra*. In addition, note that the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945); *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960); *Ritchie v. Vast Resources Inc. d/b/a Topco Sales*, 90 USPQ2d 1668 (Fed. Cir. 2009); and MPEP § 2144.07.

Claims 17-20

Fisher's metal reinforcing member comprises a plurality of metal rings or a spiral/helical wire 60a, 60b, 50, *etc.* attached to the outer surface of the polymeric material (FIGS. 1-6).

Claims 21-23

APA and Akeel teach the invention substantially as claimed. However, APA and Akeel do not teach the plurality of hoses and/or cables arranged inside the inner protection hose inside the wrist parts.

Fisher teaches the plurality of hoses and/or cables 70a, 70b, 40, 38, 18, *etc.* arranged inside the inner protection hose 10 in order to provide resistance to internal pressure (*id. see, e.g.,* 2:65-4:14 and claims 1-24).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the plurality of hoses and/or cables arranged inside APA's inner protection hose in APA's robot wrist modified by Akeel in order to provide resistance to internal pressure as taught or suggested by Fisher. *KSR supra.*

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Obata *et al.* (hose 50), Malarz *et al.* (angles 70, 84, *etc.*), and Akeel *et al.*'486 (angles in FIG. 2).

15. Applicant's arguments filed April 7, 2011 have been fully considered but they are not persuasive.

In response to Applicant's remarks regarding the Office action on December 7, 2010, the Examiner respectfully submits that:

(a) The previous drawing objections and rejections under 35 USC 112, ¶ 2nd, are withdrawn in view of Applicant's remarks (Amend. pp. 9 and 10); and

(b) The previous art rejections under 35 USC 102(b) and 103(a) are also withdrawn in view of Applicant's amendments to the claims. Applicant's arguments with respect to claims 1-4, 9-24, and 26-28 have been considered but are moot in view of the new grounds of rejection.

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16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vinh Luong whose telephone number is (571) 272-7109. The examiner can normally be reached on Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on 571-272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Vinh Luong/
Primary Examiner, Art Unit 3656